Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. CIR-PDR-006 (Automatically generated) **Review** PDR - Preliminary Design Review **Date** 6/1/1999 MM/DD/YYYY

System/Subsystem **Phase** **Type**

Brief Description **FCF Stowed Equipment Deployment**

Submitted by:

Last Name

First Name

Phone

Organization

E-Mail Address

Statement of Concern:

At the time each FCF rack is deployed to ISS, launch upmass, upvolume, and on-orbit stowage must be provided to allow stowed FCF equipment (i.e., FCF equipment not installed in the racks at launch) to be deployed. It was indicated in the FCF PDR presentations that the equivalent volume of one additional rack may be involved when each FCF rack is deployed to ISS. While the FCF racks themselves are accounted for in ISS manifesting, no specific agreements exist with ISS for FCF logistics to account for the deployment of this stowed equipment.

Recommended Action:

Identify specific upmass, upvolume and stowage requirements for stowed equipment to be deployed to ISS with each FCF rack. Verify with ISS that upmass, upvolume and on-orbit stowage requirements are within Utilization Flight allocations. If not, work issues with ISS and reach agreement by CDR.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. CIR-PDR-006 (Automatically generated) **Review** PDR - Preliminary Design Review **Date** 6/1/1999 MM/DD/YYYY

System/Subsystem **Phase** **Type**

Brief Description **FCF Stowed Equipment Deployment**

RFA Disposition: **Assigned To**

Rationale **Due Date** MM/DD/YYYY

RFA Closure: (Summarize response and supporting data as required).

Date Closed **Addendum?** ○ No ○ Yes **Date Originator Concurrence Received** MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. CIR-PDR-009 (Automatically generated)
Review PDR - Preliminary Design Review
Date 6/1/1999 MM/DD/YYYY

System/Subsystem
Phase
Type

Brief Description CIR Chamber Cleaning/Contamination Control

Submitted by:

Last Name
First Name
Phone
Organization
E-Mail Address

Statement of Concern:

The cleanliness requirements for the CIR chamber and the windows are sketchy at best. Much more definition of the cleanliness and window performance requirements and plans to achieve and verify are needed.

Recommended Action:

A program to define window and chamber internal cleanliness requirements must be initiated. Development of cleaning procedures to meet these requirements must be developed. Laboratory studies must be an integral part of this to verify that following these procedures will meet the defined requirements, including how the cleanliness will be verified on-orbit.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. CIR-PDR-009 (Automatically generated)

Review PDR - Preliminary Design Review

Date 6/1/1999 MM/DD/YYYY

System/Subsystem

Phase

Type

Brief Description CIR Chamber Cleaning/Contamination Control

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-001 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/16/2001 MM/DD/YYYY

System/Subsystem FCF Software
Phase
Type

Brief Description FCF Software Development Environment

Submitted by:

Last Name Jenkens
First Name Bob
Phone (301) 286-8520
Organization GSFC
E-Mail Address robert.jenkens@gsfc.nasa.gov

Statement of Concern:

The FCF software development environment is being developed and utilized by the Exhibit 1 contractor to develop, validate, and deliver the initial operational build of software. However, during the PDR discussions, it was identified that the development environment is not a contractually required deliverable item under the Exhibit 1 contract. Furthermore, it is unclear how the Exhibit 2 contract/contractor, which has the responsibility for lifecycle maintenance and enhancement of FCF software, will acquire the necessary software development environment.

Recommended Action:

Evaluate the Project's requirement for a FCF software development environment, and develop an approach to satisfy the need.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-001 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/16/2001 MM/DD/YYYY

System/Subsystem FCF Software

Phase

Type

Brief Description FCF Software Development Environment

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-002 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/14/2001 MM/DD/YYYY

System/Subsystem FCF
Phase
Type

Brief Description FCF Metrics

Submitted by:

Last Name Labus
First Name Tom
Phone (216) 433-2342
Organization GRC
E-Mail Address Thomas.L.Labus@grc.nasa.gov

Statement of Concern:

Minimal metrics were presented at the FCF PDR to provide an overall measure of the project status and the rate of progress. This could include: Percentage drawings, lines of code of software, TBDs in ICDs, science requirements, development hardware risks, weight, RID closure, etc.

Recommended Action:

Start utilizing project metrics so that progress can be measured and issues can be identified in the process of reaching the CDR milestone.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-002 (Automatically generated) **Review** PDR - Preliminary Design Review **Date** 2/14/2001 MM/DD/YYYY

System/Subsystem FCF **Phase** **Type**

Brief Description FCF Metrics

RFA Disposition:

Assigned To

Rationale

Due Date MM/DD/YYYY

RFA Closure: (Summarize response and supporting data as required).

Date Closed **Addendum?** ○ No ○ Yes **Date Originator Concurrence Received** MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-003 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/14/2001 MM/DD/YYYY

System/Subsystem FCF
Phase
Type

Brief Description Software/Avionics Review

Submitted by:

Last Name Labus
First Name Tom
Phone (216) 433-2342
Organization GRC
E-Mail Address Thomas.L.Labus@grc.nasa.gov

Statement of Concern:

Software and avionics is imbedded within each of the rack product teams. Only a top-level software architecture was presented at the PDR. No formal system level reviews are planned. Software and avionics architectures and status were not presented to any level of detail at the PDR. Concern was raised on the progress made to date. No formal system review of the software/avionics is planned.

Recommended Action:

Schedule a stand-alone informal avionics and software review for the FCF. This review should include the approach to verification. This review should include flight, as well as ground systems.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-003 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/14/2001 MM/DD/YYYY

System/Subsystem FCF

Phase

Type

Brief Description Software/Avionics Review

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-004 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/14/2001 MM/DD/YYYY

System/Subsystem FCF
Phase
Type

Brief Description GFE

Submitted by:

Last Name Miller
First Name Michael
Phone (281) 336-4232
Organization JSC
E-Mail Address mdmiller@ems.jsc.nasa.gov

Statement of Concern:

GFE is a substantial part of the FCF Program and there is significant risk associated with GFE to the FCF cost and schedule. Several items of GFE such as ARIS, ISPR, ISPR Outfitting Kits, Microgravity Rack Barriers, PRCU are under JSC control and these items and associated support need to be committed to by JSC and GRC. Schedules for GFE items and support must be defined that support FCF integration and delivery. Roles and responsibilities should be identified and documented between JSC, Boeing, GRC, and FDC.

Several RIDs on GFE were also rejected by the FCF contractor at the FCF PDR. These should be evaluated by GRC.

Recommended Action:

Document agreements on GFE delivery and support between JSC, GRC, Boeing, and FDC, including detailed schedules and a work plan for support.

Evaluate RIDs on GFE that were submitted at the PDR.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-004 (Automatically generated) **Review** PDR - Preliminary Design Review **Date** 2/14/2001 MM/DD/YYYY

System/Subsystem FCF **Phase** **Type**

Brief Description GFE

RFA Disposition: **Assigned To**

Rationale **Due Date** MM/DD/YYYY

RFA Closure: (Summarize response and supporting data as required).

Date Closed **Addendum?** ○ No ○ Yes **Date Originator Concurrence Received** MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-005 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/14/2001 MM/DD/YYYY

System/Subsystem FCF
Phase
Type

Brief Description ARIS RS-232 Interfaces

Submitted by:

Last Name Miller
First Name Michael
Phone (281) 336-4232
Organization JSC
E-Mail Address mdmiller@ems.jsc.nasa.gov

Statement of Concern:

FCF rack designs do not provide RS-232 interface at the front of the rack per the CR5057 update to SSP 57005 ARIS to Payload ICD.

Recommended Action:

Incorporate RS-232 interface per SSP 57005 for ARIS.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-005 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/14/2001 MM/DD/YYYY

System/Subsystem FCF

Phase

Type

Brief Description ARIS RS-232 Interfaces

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-006 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/14/2001 MM/DD/YYYY

System/Subsystem FCF
Phase
Type

Brief Description Potential ISPR to FCF Interferences

Submitted by:

Last Name Miller
First Name Michael
Phone (281) 336-4232
Organization JSC
E-Mail Address mdmiller@ems.jsc.nasa.gov

Statement of Concern:

Presentations and supporting PDR documentation did not fully address all packaging concerns. These include: (1) Rack doors and ARIS snubbers - does the door clear the snubbers when opened? (2) ISPR center post fittings and optics bench and avionics boxes - does the optics bench clear the center post fittings on top; do AV boxes fit with center post fittings on bottom? Reference drawing 683-50184. (3) Human factors keepout envelopes were not defined for connectors on optics bench or for PI power/thermal; space between PI packages not defined to allow crew installation. (4) Internal ARIS cable harness for 4 post configuration. (5) Rack maintenance switch location. (6) Accumulator and launch restraints. (7) ARIS accelerometers - do they interfere with FIR/SAR optics bench?

Recommended Action:

Model all hardware in 3D CAD to ensure no interferences exist. Add requirements to the IDDs that define keepout envelopes to allow crew access to connectors and packages for installation and removal.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-006 (Automatically generated) **Review** PDR - Preliminary Design Review **Date** 2/14/2001 MM/DD/YYYY

System/Subsystem FCF **Phase** **Type**

Brief Description Potential ISPR to FCF Interferences

RFA Disposition: **Assigned To**

Rationale **Due Date** MM/DD/YYYY

RFA Closure: (Summarize response and supporting data as required).

Date Closed **Addendum?** ○ No ○ Yes **Date Originator Concurrence Received** MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-007 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem FCF/FIR and SAR
Phase
Type

Brief Description Human Factors - Access to All Connectors

Submitted by:

Last Name Stefanyshyn-Piper
First Name Heide
Phone (281) 244-8844
Organization JSC
E-Mail Address hstefany@ems.jsc.nasa.gov

Statement of Concern:

When the rack is populated to the maximum science volume, it is unsure if sufficient access is available for connector access (i.e., gas and water), which need to be connected with the bench in the stowed position. Also, depending on the height and amount of science packages, can the bench be accessed for attachment mechanism, cable routing, etc.

Recommended Action:

Ensure that human factors requirements are met to ensure that connectors and mechanisms are accessible by all crew members.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-007 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem FCF/FIR and SAR

Phase

Type

Brief Description Human Factors - Access to All Connectors

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-008 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem Command and Data
Phase
Type

Brief Description Data Handling Requirements Not Clearly Defined

Submitted by:

Last Name Taylor
First Name Irene
Phone (256) 544-2051
Organization MSFC
E-Mail Address Irene.Taylor@msfc.nasa.gov

Statement of Concern:

Experiment data requirements severely exceed the stated capabilities of the FCF. The project requirements concerning data handling do not appear to be a verifiable design parameter. Methods proposed for capturing and downlinking data are not sufficient for many of the representative experiments. Data system compliance to requirements is not demonstrated for many of the “yes” responses in the compliance matrix. Compression and data reduction schemes should be advertised capability, but they are only viable to the PIs which accept the resulting products when compared to original source data. Requirements for FCF command and telemetry throughput, including data storage capacity, real-time data available to the PI (at TSC) during the test, and maximum allowable data latency are not adequately defined. Significant technical, schedule, and cost risk exist to the FCF contractor, the government, and the PI, due to the requirement ambiguity. A design compliance assessment is not possible until the requirements are definitized and a corresponding hardware design and operational concept is produced.

Recommended Action:

(1) Clarify the FCF requirements for command and data handling. (2) Preliminary analysis of command and telemetry throughput is needed, including PI interaction on decisions to proceed with subsequent sample runs. (3) Update the FCF hardware and operations design to accommodate the definitized requirements. Conduct a delta design review to assess compliance.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-008 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem Command and Data

Phase

Type

Brief Description Data Handling Requirements Not Clearly Defined

RFA Disposition:

Assigned To

Rationale

Due Date MM/DD/YYYY

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-009 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem FCF System PDR
Phase
Type

Brief Description Configuration Management System

Submitted by:

Last Name Gauntner
First Name Daniel
Phone (216) 433-3254
Organization GRC
E-Mail Address Daniel.Gauntner@grc.nasa.gov

Statement of Concern:

The contractor system for configuration management (CM) was inadequately shown. Philosophies for the baselining of project products (designs, documents, drawings) were insufficiently explained to determine when the project plans to put items under CM (change control, version update procedures, adequate dating and numbering). Project personnel did not appear to be sufficiently knowledgeable about CM plans to assure proper command and control in the future. Examples: PDR review documents were described as “controlled documents,” yet pages were not dated. Common hardware show different values between documents (ARIS weighs 75.5 or 75.6 lbs. for CIR or FIR).

Recommended Action:

(1) Complete CM philosophy and planning document according to accepted ISS practices. (2) Train project personnel on its use and applications. (3) Apply to controllable items.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-009 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem FCF System PDR

Phase

Type

Brief Description Configuration Management System

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-010 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem
Phase
Type

Brief Description Cleanup of Research Environment

Submitted by:

Last Name Driscoll
First Name James
Phone (734) 936-0101
Organization University of Michigan
E-Mail Address jamesfd@umich.edu

Statement of Concern:

Soot particulates, solid combustion particulates and colloidal microparticles may coat the windows and exhaust ducts, and may contaminate future experiments. A procedure is needed to clean the walls.

Recommended Action:

Identify hardware/procedures to clean windows, exhaust ducts.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-010 (Automatically generated) **Review** PDR - Preliminary Design Review **Date** 2/15/2001 MM/DD/YYYY

System/Subsystem **Phase** **Type**

Brief Description Cleanup of Research Environment

RFA Disposition: **Assigned To**

Rationale **Due Date** MM/DD/YYYY

RFA Closure: (Summarize response and supporting data as required).

Date Closed **Addendum?** ○ No ○ Yes **Date Originator Concurrence Received** MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-011 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem

Phase

Type

Brief Description Periodic Re-Calibration

Submitted by:

Last Name	Driscoll
First Name	James
Phone	(734) 936-0101
Organization	University of Michigan
E-Mail Address	jamesfd@umich.edu

Statement of Concern:

To maintain the accuracy of flow metering, spatial positioning, etc. of components on the CIR and FIR, periodic recalibration will be needed. Comment on how this would be done.

Recommended Action:

Identify hardware/procedures needed in the FIR and CIR designs that would accommodate future recalibration.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-011 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem

Phase

Type

Brief Description Periodic Re-Calibration

RFA Disposition:

Assigned To

Rationale

Due Date MM/DD/YYYY

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-012 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem
Phase
Type

Brief Description FCF Design Changes from ARIS Alterations

Submitted by:

Last Name Gauntner
First Name Daniel
Phone (216) 433-3254
Organization GRC
E-Mail Address Daniel.Gauntner@grc.nasa.gov

Statement of Concern:

The integrated discussions of the ARIS system have indicated a number of changes that may/will be needed for the overall/common design. Impacts due to these changes on the mass properties and thermal control systems have not been quantified. Given the closeness of today's performance estimate to current controlled resource limits, a less-than-timely accommodation of these changes make impact performance and delivery considerations.

Recommended Action:

(1) Clarify contract-versus-customer responsibilities for all aspects of the ARIS. (2) Generate risk impacts (detailed/quantitative) for the various changes. (3) Systematically consider ARIS impacts as other design needs are fulfilled (e.g., rack to rack cabling, ORU changeouts).

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-012 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem

Phase

Type

Brief Description FCF Design Changes from ARIS Alterations

RFA Disposition:

Assigned To

Rationale

Due Date MM/DD/YYYY

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-013 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem CIR/FIR Structures
Phase
Type

Brief Description Mass Properties Control Plan

Submitted by:

Last Name Gauntner and Jenkens
First Name Dan and Bob
Phone (216) 433-3254 and (301) 286-8520
Organization GRC and GSFC
E-Mail Address Daniel.Gauntner@grc.nasa.gov and robert.jenkens@gsfc.nasa.gov

Statement of Concern:

Mass properties are recognized to have insufficient margin and identified as a major risk. However, no specific details or actions were presented to resolve the issue. A review of the FCF Mass Properties Control Plan yielded several additional concerns. The plan does not show what articles have controlled masses (component, subsystem, and system) versus assemblies that may allow uncontrolled tracking of mass among their constituent parts. Also, no evidence was presented to show the mass and c.g. control procedures are being followed. The contractor also has not fully investigated the margin associated with the GFE items. (Currently carrying zero margin.)

Recommended Action:

(1) NASA/FCF project review and confirm mass requirements; (2) FCF contractor to revise Mass Properties control plan to adopt an explicit approach for mass and c.g. control; update the CIR/FIR/SAR mass properties tables; implement and aggressively execute the plan to mitigate the risk and ensure requirements are achieved; conduct study to identify potential mass savings through redesign or material changes.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-013 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem CIR/FIR Structures

Phase

Type

Brief Description Mass Properties Control Plan

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-014 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem CIR/FIR/SAR
Phase
Type

Brief Description Optics Bench Electrical Connector Design Life Accommodation

Submitted by:

Last Name Jenkens
First Name Bob
Phone (301) 286-8520
Organization GSFC
E-Mail Address robert.jenkens@gsfc.nasa.gov

Statement of Concern:

The CIR/FIR/SAR optical bench design contains recessed electrical connectors without provision for on-orbit replacement. No requirement has been derived for the number of mate/de-mates over the 10 year mission life or to accommodate repair of a damaged connector.

Recommended Action:

Evaluate the optics bench electrical connector design versus the 10 year life requirement. Modify the connector design as necessary.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-014 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem CIR/FIR/SAR

Phase

Type

Brief Description Optics Bench Electrical Connector Design Life Accommodation

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-015 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem FCF
Phase
Type

Brief Description Facility and PI Technical Communications

Submitted by:

Last Name Holt
First Name Glynn
Phone (617) 353-9594
Organization Boston University
E-Mail Address rgholt@bu.edu

Statement of Concern:

Several particular issues have highlighted a deficiency in the two-way communication between PIs and Facility. These issues are: (1) Data storage compression and resources: media capacity, compression scheme(s) are not defined, and current storage/downlink solutions do not meet PI requirements without compression. (2) Considering the larger (particularly fluids) pre-flight PI community, the lack of pulsed light sources represents a deficit in fundamental diagnostic capabilities. (3) The temperature environment does not meet PI requirements. Currently, ALL “basis" and “real" experiments will require PI to provide own temperature controlled for test chambers to meet requirements. Future PIs will encounter the same problem.

Recommended Action:

(1) Facility should prepare brief communication to PIs (flight and ground) addressing at least issues 1-3, and current FCF solutions and requesting more detailed input from PI community. (2) Yearly PI/Facility meetings should be scheduled to assess issues such as above. Meetings should be open to all program PIs and not limited to flight PIs.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-015 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem FCF

Phase

Type

Brief Description Facility and PI Technical Communications

RFA Disposition:

Assigned To

Rationale

Due Date MM/DD/YYYY

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-016 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem FIR and SAR
Phase
Type

Brief Description Constant Temperature at Payload Test Chamber

Submitted by:

Last Name Holt
First Name Glynn
Phone (617) 353-9594
Organization Boston University
E-Mail Address rgholt@bu.edu

Statement of Concern:

The temperature environment at the test chamber on the optical bench will not meet PI requirements. Currently each individual PI must design constant-temperature control for the test chamber.

Recommended Action:

Since every PI has this need, Facility should investigate providing a constant-temperature control consisting of a closed fluid loop with heat/cold source and both similar to standard commercial baths with digital controllers for near-ambient control (0-30 degrees C, constant temp +/- 0.1 degrees C typical). This could be accessed via quick disconnects on the rack, and controlled via FSAP.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-016 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem FIR and SAR

Phase

Type

Brief Description Constant Temperature at Payload Test Chamber

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-017 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem FIR/SAR
Phase
Type

Brief Description No Pulsed Illumination Capability

Submitted by:

Last Name Holt
First Name Glynn
Phone (617) 353-9594
Organization Boston University
E-Mail Address rgholt@bu.edu

Statement of Concern:

The Facility provides no pulsed illumination capability. Pulsed illumination allows shorter illumination times then achievable with either current electronic shuttering or HFR camera rates. Pulsed illumination also allows PIV capability beyond frame-to-frame particle tracking.

Recommended Action:

Provide pulsed illumination. One approach would be to incorporate new driving electronics for existing facility laser diodes and Nd YAg laser.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-017 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem FIR/SAR

Phase

Type

Brief Description No Pulsed Illumination Capability

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-018 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem FCF
Phase
Type

Brief Description cPCI Bus Card Availability and Fast A/D

Submitted by:

Last Name Holt
First Name Glynn
Phone (617) 353-9594
Organization Boston University
E-Mail Address rgholt@bu.edu

Statement of Concern:

The Facility has chosen the cPCI bus to accommodate PI needs beyond Facility-provided capabilities. It is not clear that commercially available cPCI cards exist to cover PI needs. The most obvious example is a fast (greater than or equal to 1 Msamples per second A/D) multfunction A/D card. The fastest A/D rate provided by Facility is 125 kS/s.

Recommended Action:

Investigate availability of cPCI bus cards and demonstrate that > 1 MS/s A/D is available commercially at competitive costs (compared to PCI cards).

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-018 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem FCF

Phase

Type

Brief Description cPCI Bus Card Availability and Fast A/D

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-019 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/15/2001 MM/DD/YYYY

System/Subsystem CIR/FIR/SAR Sys. Eng.
Phase
Type

Brief Description Non-Approved Requirement Exceptions

Submitted by:

Last Name Jenkens
First Name Bob
Phone (301) 286-8520
Organization GSFC
E-Mail Address robert.jenkens@gsfc.nasa.gov

Statement of Concern:

The CIR/FIR/SAR design identified a number of requirements that will need exceptions to be granted. Until the exceptions are approved or rejected, the design compliance will remain unresolved and represents an unquantified technical and programmatic risk.

Recommended Action:

(1) Include exceptions submittal dates on FCF and rack schedules as appropriate. (2) Finalize and submit all requests for exceptions as soon as possible. (3) Upon exception approval/rejection, modify the requirements and design as necessary.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-019 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/15/2001 MM/DD/YYYY

System/Subsystem CIR/FIR/SAR Sys. Eng.

Phase

Type

Brief Description Non-Approved Requirement Exceptions

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-020 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/16/2001 MM/DD/YYYY

System/Subsystem FCF
Phase
Type

Brief Description Operations Concept

Submitted by:

Last Name Stefanyshyn-Piper
First Name Heide
Phone (281) 244-8844
Organization JSC
E-Mail Address hstefany@ems.jsc.nasa.gov

Statement of Concern:

Operations concept of the integrated facility seems missing. Individual racks and experiments were presented but there was no integration of all three in an operations state. How are the ISS resources (power, coolant, downlink, crew time) shared between the facility? Does the timeline support the requirement to complete the required 10 experiments per year? What is the plan for resupply and logistics support? Does the up-mass include PI experiments?

Recommended Action:

Develop an integrated operations timeline which demonstrates that the requirements can be met within given resources (power, data stowage, etc.).

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-020 (Automatically generated) **Review** PDR - Preliminary Design Review **Date** 2/16/2001 MM/DD/YYYY

System/Subsystem FCF **Phase** **Type**

Brief Description Operations Concept

RFA Disposition: **Assigned To**

Rationale **Due Date** MM/DD/YYYY

RFA Closure: (Summarize response and supporting data as required).

Date Closed **Addendum?** ○ No ○ Yes **Date Originator Concurrence Received** MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-021 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/16/2001 MM/DD/YYYY

System/Subsystem Power
Phase
Type

Brief Description Power System Constraints on Payloads

Submitted by:

Last Name Taylor
First Name Irene
Phone (256) 544-2051
Organization MSFC
E-Mail Address Irene.Taylor@msfc.nasa.gov

Statement of Concern:

Power requirements and constraints on FCF core equipment and common equipment need clarification. The power allocated to experiments may be too constrained to achieve the targeted payload support rates. The thermal capabilities and power connectivity should accommodate payload designs which exceed the stated “power available to payloads” in the individual racks.

Recommended Action:

Clarify power requirements on all three racks and the available power to payloads for simultaneous operations.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-021 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/16/2001 MM/DD/YYYY

System/Subsystem Power

Phase

Type

Brief Description Power System Constraints on Payloads

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

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Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-022 (Automatically generated)
Review PDR - Preliminary Design Review
Date 2/16/2001 MM/DD/YYYY

System/Subsystem Level 1 Requirements
Phase
Type

Brief Description Compliance with Utilization Rate Requirements

Submitted by:

Last Name Taylor
First Name Irene
Phone (256) 544-2051
Organization MSFC
E-Mail Address Irene.Taylor@msfc.nasa.gov

Statement of Concern:

Compliance with requirements for accommodating 5 combustion and 5 fluids experiments per year has not been demonstrated. The Level 1 Requirement includes a utilization rate of 10 fluids and 10 combustion experiments per year, if resources permit. Evidence was not shown that the contractor is incorporating this requirement into the design.

Recommended Action:

Perform comprehensive traffic flow analysis of all resources (both flight and ground) for payload integration, testing, on-orbit operations, and ground support.

Initiators: Do not complete below this line. For FCF Project Office Use Only.

Fluids and Combustion Facility (FCF)

Request For Action (RFA)

RFA No. FCF-PDR-022 (Automatically generated)

Review PDR - Preliminary Design Review

Date 2/16/2001 MM/DD/YYYY

System/Subsystem Level 1 Requirements

Phase

Type

Brief Description Compliance with Utilization Rate Requirements

RFA Disposition:

Assigned To

Due Date MM/DD/YYYY

Rationale

RFA Closure: (Summarize response and supporting data as required).

Date Closed

Addendum? ○ No ○ Yes

Date Originator Concurrence Received MM/DD/YYYY

Project Manager's Signature for Disposition/Date

Cognizant Engineer's Signature for Closure/Date

Project Manager's Signature for Acceptance/Date

Convening Authority's Concurrence Signature/Date

Note: Official signatures on file in the configuration management system.